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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,850	09/12/2003	Alexander Belokon	46633/264930	8546

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EXAMINER	
VERDIER, CHRISTOPHER M	
ART UNIT	**PAPER NUMBER**
3745	

DATE MAILED: 08/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/661,850	BELOKON ET AL.	
	Examiner	Art Unit	
	Christopher Verdier	3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-23 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 5-8 and 17-18 is/are allowed.

6)☒ Claim(s) 1-4,13,14,16 and 19 is/are rejected.

7)☒ Claim(s) 9-12, 15, 20-23 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 12 September 2003 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 9-12-03, 2-14-05.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Drawings

The drawings are objected to because in figure 3, arrows 76 and 78 are blurred and unclear. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informality: Appropriate correction is required.

On page 10, line 18, -- is -- should be inserted after "that".

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 1, lines 13-15, which recite "at least part of the leakage pathway being defined between the surface of the compressor wheel and the fixed wall of the compressor housing"

Claim 13, lines 13-15, which recite "at least part of the leakage pathway being defined between the surface of the compressor wheel and the fixed wall of the compressor housing".

Claims 16-18, line 2, which recite "substantially no fuel escapes from the compressor".

Claim 16, lines 4-6, which recite "at least part of the leakage pathway being defined between the surface of the compressor wheel and a wall of a housing of the compressor".

Claim Objections

Claims 9-12 and 15 are objected to because of the following informalities: Appropriate correction is required.

In claim 9, line 24, -- the – should be inserted after "into".

In claim 15, line 24, -- the – should be inserted after "into".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by Soviet Union Patent 848,914 (figure 1). Note the compressor for compressing air and gaseous fuel, comprising a rotatable shaft 3, a compressor wheel 7 mounted on the shaft, the wheel having a plurality of blades 7 affixed thereto, a bearing casing (near reference numeral 8) defining an interior space, a bearing 4 mounted in the bearing casing and rotatably supporting the shaft, a compressor housing 1 surrounding the wheel, the compressor housing defining a main gas flow path, the compressor housing having an unnumbered fixed wall immediately adjacent to and spaced from a surface of the compressor wheel, the surface extending from a location adjacent the main gas flow path generally radially inwardly toward the bearing casing, the compressor housing and bearing casing defining a leakage pathway from the main gas flow path of the compressor into the interior of the bearing casing, at least part of the leakage pathway being defined between the surface of the compressor wheel and the fixed wall of the compressor housing, and a sealing arrangement 12 located in the leakage pathway, the sealing arrangement comprising a hydraulic resistance element 12 disposed between the surface of the compressor wheel and the fixed wall of the compressor housing, a portion of the leakage pathway that extends from the hydraulic resistance element to the bearing casing being free of any further

hydraulic resistance elements, and a pressurized air supply duct 22 leading through the compressor housing into the portion of the leakage pathway. The hydraulic resistance element comprises a labyrinth seal 12. Note that the recitation in claim 1, line 1 of "for compressing gaseous fuel" is a recitation of intended use. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 312 F.2d 937, 939, 136 USPQ 458, 459 (CCPA 1963).

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang 4,472,107 (figures 1-2). Note the compressor for compressing air and gaseous fuel, comprising a rotatable shaft 11, a compressor wheel 26 mounted on the shaft, the wheel having a plurality of blades 35 affixed thereto, a bearing casing 30 defining an interior space, a bearing 13 mounted in the bearing casing and rotatably supporting the shaft, an unnumbered compressor housing surrounding the wheel, the compressor housing defining a main gas flow path, the compressor housing having an unnumbered fixed wall immediately adjacent to and spaced from a surface of the compressor wheel, the surface extending from a location adjacent the main gas flow path generally radially inwardly toward the bearing casing, the compressor housing and bearing casing defining a leakage pathway from the main gas flow path of the compressor into the interior of the bearing casing, at least part of the leakage pathway being defined between the

surface of the compressor wheel and the fixed wall of the compressor housing, and a sealing arrangement 49 located in the leakage pathway, the sealing arrangement comprising a hydraulic resistance element 49 disposed between the surface of the compressor wheel and the fixed wall of the compressor housing, a portion of the leakage pathway that extends from the hydraulic resistance element to the bearing casing being free of any further hydraulic resistance elements, and a pressurized air supply duct 53 leading through the compressor housing into the portion of the leakage pathway. The hydraulic resistance element comprises a labyrinth seal 49. An oil supply duct 16 leads through the bearing casing into the interior thereof for supplying lubricating oil to the bearing 13, and an oil drain 24 leads out from the interior of the bearing casing for evacuating air and oil from the bearing casing. Note that the recitation in claim 1, line 1 of "for compressing gaseous fuel" is a recitation of intended use, as set forth above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent 518,027 in view of Frister 4,253,031. The European Patent (figures 1-2) discloses a compressor compressing air substantially as claimed, comprising a rotatable shaft 2, a compressor wheel mounted on the shaft, the wheel having a plurality of blades 1 affixed thereto, a bearing casing 12 defining an interior space, a compressor housing 12 surrounding the wheel, the compressor housing defining a main gas flow path, the compressor housing having an unnumbered fixed wall immediately adjacent to and spaced from a surface of the compressor wheel, the surface extending from a location adjacent the main gas flow path generally radially inwardly toward the bearing casing, the compressor housing and bearing casing defining a leakage pathway from the main gas flow path of the compressor into the interior of the bearing casing, at least part of the leakage pathway being defined between the surface of the compressor wheel and the fixed wall of the compressor housing, and a sealing arrangement 15 located in the leakage pathway, the sealing arrangement comprising a hydraulic resistance element 15 disposed between the surface of the compressor wheel and the fixed wall of the compressor housing, a portion of the leakage pathway that extends from the hydraulic resistance element to the bearing casing being free of any further hydraulic resistance elements, and a pressurized air supply duct 9 leading through the compressor housing into the portion of the leakage pathway. The hydraulic

resistance element comprises a labyrinth seal 15. Note that the recitation in claim 1, line 1 of "for compressing gaseous fuel" is a recitation of intended use as above.

However, the European Patent does not disclose a bearing mounted in the bearing casing and rotatably supporting the shaft. Rather, bearings 3 and 4 are thrust bearings.

Frister (figure 1) shows a turbo-supercharger 1 having a compressor 3 with a shaft 6 supported by bearings 4, 5 in a bearing casing 12, 13, for the purpose of rotatably supporting the shaft.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the European Patent 518,027 with bearings mounted in the bearing casing, for the purpose of rotatably supporting the shaft.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent 518,027 and Frister 4,253,031 as applied to claim 1 above, and further in view of Mock 1,998,784. The modified compressor of the European Patent shows all of the claimed subject matter including the compressor housing defining an inlet duct 12 through which air is led into the compressor, but does not show a fuel supply duct leading into the inlet duct for supplying fuel into the compressor.

Mock (figure 1) shows a supercharger having a fuel supply duct 17/19 leading into an inlet duct 5 of a compressor of the supercharger, for the purpose of providing air and fuel to an engine for combustion.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to provide the modified compressor/supercharger of the European Patent with a fuel supply duct leading into the inlet duct for supplying fuel into the compressor, as taught by Mock, for the purpose of providing air and fuel to the engine for combustion.

Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soviet Union Patent 848,914 in view of Postuchow 5,816,784. The Soviet Union Patent 848,914 (figure 1) discloses a compressor for compressing air and gaseous fuel substantially as claimed, comprising a rotatable shaft 3, a compressor wheel 7 mounted on the shaft, the wheel having a plurality of blades 7 affixed thereto, a bearing casing (near reference numeral 8) defining an interior space, a bearing 4 mounted in the bearing casing and rotatably supporting the shaft, a compressor housing 1 surrounding the wheel, the compressor housing defining a main gas flow path, the compressor housing having an unnumbered fixed wall immediately adjacent to and spaced from a surface of the compressor wheel, the surface extending from a location adjacent the main gas flow path generally radially inwardly toward the bearing casing, the compressor housing and bearing casing defining a leakage pathway from the main gas flow path of the compressor into the interior of the bearing casing, with the leakage pathway defining a portion that extends radially inwardly into the bearing casing, at least part of the leakage pathway being

defined between the surface of the compressor wheel and the fixed wall of the compressor housing, and a pressurized air supply duct 22 leading through the compressor housing into the portion of the leakage pathway. Note that the recitation in claim 1, line 1 of "for compressing gaseous fuel" is a recitation of intended use.

However, the Soviet Union Patent 848,914 does not disclose a sealing arrangement located in the leakage pathway, the sealing arrangement comprising a plurality of auxiliary blades mounted on the surface of the compressor wheel proximate the fixed wall of the compressor housing, the auxiliary blades being structured and arranged to draw air radially outwardly therethrough and raise the pressure of the air and inject the air into the main gas flow path of the compressor.

Postuchow (figure 1) shows a centrifugal pump having a sealing arrangement E in the form of an expeller located in a leakage pathway from a main flow path of the pump into an interior of a bearing casing F, the sealing arrangement comprising a plurality of auxiliary blades near E mounted on a surface of a pump wheel I proximate a fixed wall P of a pump housing, the auxiliary blades being structured and arranged to draw air or working fluid radially outwardly therethrough and raise the pressure of the air or working fluid and inject the air or working fluid into the main flow path of the pump, for the purpose of preventing leakage along a shaft S to the unnumbered bearing that supports the shaft.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the compressor of Soviet Union Patent 848,914 with a sealing arrangement located in the leakage pathway, the sealing arrangement comprising a plurality of auxiliary blades mounted on the surface of the compressor wheel proximate the fixed wall of the compressor housing, the auxiliary blades being structured and arranged to draw air radially outwardly therethrough and raise the pressure of the air and inject the air into the main gas flow path of the compressor, as taught by Postuchow, for the purpose of preventing leakage along the shaft to the bearing that supports the shaft. Although Postuchow is directed towards a centrifugal pump and the Soviet Union Patent is directed towards a centrifugal compressor, one of ordinary skill in the art would have recognized that the teachings of Postuchow are applicable to the centrifugal compressor of the Soviet Union Patent, due to the similar nature of the centrifugal fluid flow and the fact that centrifugal compressors and centrifugal pumps differ mainly in the type of working fluid utilized.

Claims 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent 518,027 in view of Jones 6,478,469. The European Patent (figures 1-2) discloses a method for sealing a compressor used for compressing air substantially as claimed, with the compressor defining a leakage pathway that leads from a main gas flow path of the compressor generally radially inwardly into a bearing casing 12 of the compressor, at least part of the leakage pathway being defined between a surface of a compressor wheel 1 and a wall of a housing of the compressor, the method comprising the steps of providing at least one hydraulic resistance element 15 disposed between the surface of the compressor wheel and the wall of the

compressor housing, the leakage pathway defining a portion that extends radially inwardly from the at least one hydraulic resistance element 15 into the bearing casing 12 and supplying pressurized air via conduit 9 that is free of fuel into the portion of the leakage pathway at a pressure greater than that in the main gas flow path such that a first portion of the pressurized air flows inwardly into the bearing casing, while a second portion of the pressurized air flows outwardly past the at least one hydraulic resistance element into the main gas flow path thereby preventing any air leaking into the bearing casing, and such that air cannot flow from the main flow gas path through the leakage pathway into the bearing area.

However, the European Patent does not disclose that the compressor compresses the combination of air and gaseous fuel, with the pressurized air supplied such that gaseous fuel is prevented from leaking into the bearing casing (claim 16), and does not disclose feeding the combination of air and fuel into the compressor, with the pressurized air supplied at a pressure sufficient to ensure that fuel cannot flow from the main gas flow path through the leakage pathway into the bearing area (claim 19).

Jones (figure 4 and column 3, lines 29-31) shows a supercharger 20 having a compressor chamber 40 in which air/fuel mixture is provided, for the purpose of providing the air/fuel mixture to an engine for combustion.

The European Patent 518,027 is directed to a supercharger (column 2, lines 66-69) for an engine. It would have been obvious at the time the invention was made to a person having

ordinary skill in the art to utilize an air/fuel mixture as the working fluid in the supercharger/ compressor of European Patent 518,027, as taught by Jones, for the purpose of providing the air/fuel mixture to the engine for combustion. Note that the modified arrangement of the European Patent 518,027 will therefore prevent any air and gaseous fuel from leaking into the bearing casing, due to arrangement of the pressurized air conduit, with the pressurized air supplied at a pressure sufficient to ensure that fuel cannot flow from the main gas flow path through the leakage pathway into the bearing area.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mongia and Mackay '607 were cited by Applicants in the specification.

Aizu is cited to show a pressurized shaft seal.

Mackay '668 is cited to show fuel supply to a compressor of a gas turbine engine.

Allowable Subject Matter

Claims 5-8 and 17-18 are allowed.

Claims 9-12 and 15 contain allowable subject matter; Applicants should correct the informalities therein.

Claims 20-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.V.
July 30, 2005

Christopher Verdier
Primary Examiner
Art Unit 3745